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Abstract

REACTOR PHYSICS RESEARCH IN UNITED KINGDOM UNIVERSITIES

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The paper describes briefly the work being carried out and the results so far obtained in those British universities which are actively engaged in Reactor Physics research.

The validity of using a graphite exponential assembly for control rod measurements in place of a critical system has been in some respects confirmed at Imperial College (University of London). It appears that if control rod extrapolation lengths are measured for a single rod, two-group theory satisfactorily predicts the behaviour of two- and four-rod assemblies. At this college work on neutron slowing down is progressing, using a cadrucium covered Li-6 glass scintillation counter. Pulsed neutron measurements of diffusion parameters are also being made. The new 100 K.W. London University Reactor "Consort" will enable the effects of temperature gradients on neutron diffusion to be studied.

At Queen Mary College (London University), measurements on uranium/water lattices using resonance and $1/v$ detectors have revealed a dependence of the measured buckling upon the type of detector used. Mean neutron lifetimes in the lattices and diffusion parameters in various hydrogenous systems have been measured, using pulsed sources. A 10 watt critical reactor, designed to study hydrogeneous systems, is under construction. A novel high precision reactor

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oscillator has been developed at the college and used on Harwell reactors. Theoretical and experimental studies on the uses of stochastic reactor theory are also in hand, and a binary stochastic oscillator has been constructed.

The group at Manchester University is studying the use of pulsed source techniques for measuring diffusion parameters and absorption cross-sections, giving special care to harmonic analysis. Neutron spectra measurements are being made on a natural uranium light water exponential assembly and a large graphite stack. The group is also studying the kinetics of water moderated systems, using pulsed sources and steady state measurements on voided assemblies. The Manchester-Liverpool Joint Reactor will greatly assist this work.

At Southampton University a nuclear engineering laboratory was set up in 1961 within the Mechanical Engineering Department. The main research tool is a natural uranium/water sub-critical assembly, coupled to a 150 KV positive ion accelerator. The research group is particularly interested in the use of pulsed source techniques for measuring the buckling of an irregularly shaped core, by comparisons with a simple one.

In Scotland, reactor physics research is based on the Scottish Research Reactor Centre, at which the basic equipment is a 100 K.W. U.T.R.-100 research reactor. This is now operating. The present research programme includes the development of crystal spectrometers for neutron spectrum determination.